THE IDENTITY OF ARTHROPHYLLUM AND EREMOPANAX (ARALIACEÆ)

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ABSTRACT: Attention is drawn to many unusual features shared by *Arthrophyllum* and *Eremopanax*. The character of the endosperm (ruminate or smooth) used to separate these genera is shown to exhibit a continuous gradient. The two genera, therefore, must be united, and the necessary new combinations are made.

RÉSUMÉ : L'auteur attire l'attention sur plusieurs traits remarquables, communs aux genres *Arthrophyllum* et *Eremopanax*. L'albumen, ruminé ou lisse, utilisé pour séparer ces deux genres, montre en réalité une variation continue. En conséquence, ces deux genres doivent être réunis dans un genre unique; les nouvelles combinaisons sont établies.

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There are very few Araliaceous genera in which the gynœcium encloses a single loculus. Of these, the most well-known is *Arthrophyllum*. This well-defined genus has until now been regarded as confined to South East Asia and the adjacent islands between the Nicobars and New Guinea. Within this region twenty-one species have been distinguished (CRAIB, 1912; PHILIPSON, 1977; PHILIPSON & BUI, 1977), all with a highly distinctive flower and fruit and most with a habit of growth unique within the family. The branches which bear the inflorescences are very different from the main vegetative axes. The purely vegetative shoots bear pinnate or bipinnate leaves in spiral phyllotaxis. Axillary buds do not develop until flowering occurs, when a terminal tuft of lateral branches develops. These bear opposite leaves of reduced size and terminate in a whorl of secondary branches which may themselves bear umbellules, or which may branch again before doing so. Vegetative growth is continued by one or more innovations, with large spirally arranged leaves, arising below the crown of flowering branches.

Of the other Araliaceous genera with a single loculus *Diplopanax*, from China, is quite unlike *Arthrophyllum*. On the other hand, the only remaining genus, *Eremopanax*, with several species endemic to New Caledonia, is sufficiently similar to *Arthrophyllum* for early writers (e.g. BAILLON, 1878) to have commented on the slight nature of the differences between the two genera. Indeed, VIEILLARD when he collected the type of the species which now bears his name, gave it the manuscript name *Arthro-*

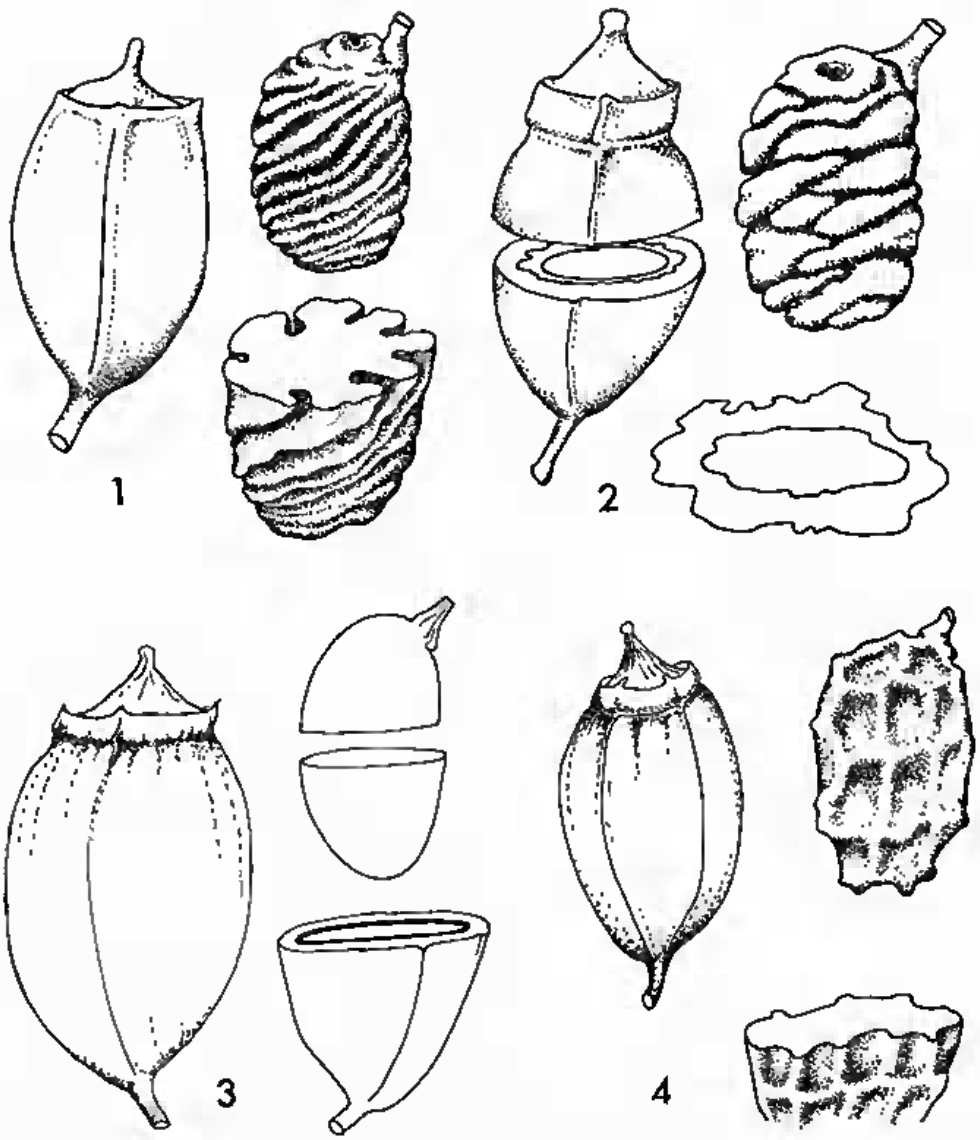
phyllum simplicifolium. A comparison of the floral morphology and growth habit of *Eremopanax* and *Arthrophyllum* has led me to the conclusion that these taxa cannot be maintained as separate genera. Some, at least, of the New Caledonian species resemble the larger Malesian species in having pinnate leaves spirally arranged on the main, purely vegetative branches, with smaller, usually opposite leaves on the lateral flowering branches. They, therefore, share the unusual features of the growth-form of *Arthrophyllum*, although some New Caledonian species are lianes, a form not found among the Indo-Malayan members. As regards inflorescence, flowers (especially stamens), and fruit, these are so like those of *Arthrophyllum*, which in turn are so unlike any other Araliaceous genus, that material from New Caledonia could be placed unhesitatingly in *Arthrophyllum*. Consequently, when all external morphological characters are considered, the two genera cannot be separated and have a whole syndrome of positive characters that unite them.

There remains to be considered the nature of the endosperm, whether ruminate or smooth, which has been used as the diagnostic character distinguishing these genera. Both HARMS (1894) and HUTCHINSON (1967) describe the endosperm of *Arthrophyllum* as deeply ruminate and that of *Eremopanax* as smooth.

Dissections of fruits of most Malesian species confirms that their endosperm is deeply ruminate, the surface being thrown into folds forming a characteristic pattern in all species examined (fig. 1). Some other features of the *Arthrophyllum* fruit worth noting are: 1) the persistence of the vascular bundle of the raphe as a prominent line on the dorsal side of the seed; 2) that the usual ovoid to subspherical form of the fruit may be modified, as in *Arthrophyllum macrocarpum* Philipson & Bui (from Laos) where the fruit is distinctly flattened, and 3) that the usual leathery consistency of the endocarp may be modified, as in the same Laotian species, in which it is chartaceous.

Fruit morphology is more varied in New Caledonia. BAUMANN-BODENHEIM (1954) divides the species of *Eremopanax* into two series on the basis of fruit form. Figures 2-4 illustrate examples of fruit from New Caledonia. Figure 2 is very similar in external form to that of most species of *Arthrophyllum*. Figure 3 is markedly compressed and is similar to *Arthrophyllum macrocarpum*. Figure 4 is intermediate between these extremes. The endocarp is hardened in all New Caledonian fruit investigated, but varies from thick stony (fig. 2) to thin cartilaginous (fig. 3). In all seeds the persistent raphe is noticeable, but the degree of surface sculpturing of the endosperm varies. In figure 3 the endosperm is quite smooth, in figure 4 it is shallowly wrinkled, but in figure 2 the endosperm is deeply fissured, in a manner similar to, if not in so extreme a form as in *Arthrophyllum*.

Seed characters as expressed in Malesia and New Caledonia may be summarized as follows. The range of external form is the same in the two regions, through the frequency of the various shapes is different. The endocarp is rarely hardened in *Arthrophyllum* and is never thick and



Pl. 1. — Fruits of **Arthrophyllum** : **1**, Malesian species showing fruit, seed with ruminate endosperm and seed in T.S.; **2**, New Caledonian species, showing fruit in T.S., seed with ruminate endosperm, and T.S. of seed and stony endocarp; **3**, New Caledonian species, showing fruit, seed in T.S. with smooth endosperm, and section of fruit with thin endosperm; **4**, New Caledonian species showing fruit, seed with wrinkled endosperm and T.S. of seed.

stone-like, whereas in *Eremopanax* the endocarp is probably always hardened it may be thin and chartaceous, but is normally thick and stony. The surface of the endosperm is always deeply ruminate in *Arthrophyllum*, whereas in *Eremopanax* it may be smooth, wrinkled or rather deeply ruminate.

It appears that there is no consistent distinction between specimens from the two regions, but rather that several fruit characters form continuous series of variation. Since the species from the two regions are so similar in many respects, and together stand so far apart from the rest of the family, to attempt their separation on slight differences in the expression of a character such as endosperm rumination appears unjustified. Their union under the earliest name, *Arthrophyllum*, is therefore proposed, and the following new combinations become necessary:

1. **Arthrophyllum balansæ** (Baill.) Philipson, *comb. nov.*

— *Eremopanax balansæ* Baill., Adansonia 12 : 160 (1878).

2. **Arthrophyllum hederoides** (Baum.-Bod.) Philipson, *comb. nov.*

— *Eremopanax hederoides* Baum.-Bod., Ber. Schweiz. Bot. Ges. 64 : 131 (1954).

3. **Arthrophyllum glaberrimum** (Baum.-Bod.) Philipson, *comb. nov.*

— *Eremopanax glaberrima* Baum.-Bod., Ber. Schweiz. Bot. Ges. 64 : 132 (1954).

4. **Arthrophyllum dænikeri** (Baum.-Bod.) Philipson, *comb. nov.*

— *Eremopanax dænikeri* Baum.-Bod., Ber. Schweiz. Bot. Ges. 64 : 132 (1954).

5. **Arthrophyllum diversifolium** (Däniker) Philipson, *comb. nov.*

— *Eremopanax diversifolia* Däniker, Vierteljahrsschr. Nat. Ges. Zürich 78, Beibl. 19 : 333 (1933).

6. **Arthrophyllum grandifolium** (Guillaum.) Philipson, *comb. nov.*

— *Eremopanax grandifolia* Guillaum., Bull. Mus. Hist. Nat. Paris 23 : 272 (1927).

7. **Arthrophyllum otopyrenum** (Baill.) Philipson, *comb. nov.*

— *Eremopanax otopyrena* Baill., Adansonia 12 : 160 (1878).

8. **Arthrophyllum schlechteri** (Harms) Philipson, *comb. nov.*

— *Eremopanax schlechteri* Harms, Bot. Jahrb. 39 : 217 (1906).

9. **Arthrophyllum angustatum** (Baill.) Philipson, *comb. nov.*

— *Eremopanax angustata* Baill., Adansonia 12 : 159 (1878).

10. **Arthrophyllum vieillardii** (Baill.) Philipson, *comb. nov.*

— *Eremopanax vieillardii* Baill., Adansonia 12 : 161 (1878).
— *Nesodoxa vieillardii* Fedde, Just's Bot. Jahresb. 1906 : 65 (1908).

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